We claim:

1. A method of sequencing a sample nucleic acid molecule, comprising:

exposing the sample nucleic acid molecule to an oligonucleotide primer and a polymerase in the presence of a mixture of nucleotides, wherein the polymerase and the nucleotides each comprise a fluorophore which emits a signal corresponding to addition of a particular nucleotide as each nucleotide is incorporated into a synthesized nucleic acid molecule which is complementary to the sample nucleic acid molecule; and

detecting the signal as each nucleotide is incorporated into the synthesized nucleic acid molecule.

2. The method of claim 1, wherein the nucleic acid is DNA and the polymerase is a DNA or RNA polymerase.

3. The method of claim 1, wherein the nucleic acid is RNA and the polymerase is reverse transcriptase.

4. The method of claim 1, wherein the polymerase is a Klenow fragment of DNA polymerase I.

5. The method of claim 1, wherein an emission signal from the fluorophore of the polymerase excites the fluorophore of one of the nucleotides, generating a unique emission signal for each nucleotide as the nucleotide is added to the synthesized nucleic acid molecule and wherein a sequence of the emission signals is detected and converted into a nucleic acid sequence.

6. The method of claim 5, wherein the unique emission signal is converted into a signal for a specific nucleotide in a nucleic acid sequence.

7. The method of claim 5, wherein the unique emission signal is generated by the group consisting of luminescence resonance energy transfer (LRET) and fluorescent resonance energy transfer (FRET).

8. The method of claim 1, wherein the fluorophore of the polymerase is a donor fluorophore and the fluorophore of each nucleotide is an acceptor fluorophore.

9. The method of claim 8, wherein each of the acceptor fluorophores is stimulated by an emission from the donor fluorophore, but each of the acceptor fluorophores emits a unique emission signal.

10. The method of claim 9 further comprising exciting the donor fluorophore to emit an excitation signal which stimulates the acceptor fluorophore to emit the unique signal corresponding to addition of a particular nucleotide.

11. The method of claim 10, wherein the donor fluorophore is green fluorescent protein (GFP).

12. The method of claim 10, wherein the acceptor fluorophores are BODIPY, fluorescein, rhodamine green, and Oregon green or derivatives thereof.

13. The method of claim 9, wherein the donor fluorophore is excited by a luminescent molecule.

14. The method of claim 13, wherein the donor fluorophore is GFP and the luminescent molecule is aequorin.

15. The method of claim 9, wherein the wherein the donor fluorophore is a luminescent molecule.

16. The method of claim 15, wherein the wherein the luminescent molecule is aequorin.

17. The method of claim 1, wherein the polymerase is a GFP-polymerase.

18. The method of claim 8, wherein the donor fluorophore and one of the acceptor fluorophores comprise a FRET pair selected from the group consisting of GFP mutant H9 and its derivatives, H9-40, tetramethylrhodamine, Lissamine™, Texas Red and naphthofluorescein.

19. The method of claim 1, further comprising fixing the polymerase to a substrate.

20. The method of claim 19, wherein the polymerase is fixed to the substrate by a linker molecule comprising a polymerase component and a substrate component.

21. The method of claim 20, wherein the linker is selected from the group consisting of streptavidin-biotin, histidine-Ni, S-tag-S-protein, and glutathione-glutathione-S-transferase (GST).

22. The method of claim 1, further comprising fixing the sample nucleic acid molecule or the oligonucleotide primer to a substrate.

23. The method of claim 1, further comprising performing a plurality of sequencing reactions substantially simultaneously, and detecting the signals from the plurality of sequencing reactions.

24. The method of claim 23, wherein a plurality of polymerases, sample nucleic acid molecules, or oligonucleotide primers are fixed directly or indirectly to the substrate in a predetermined pattern, and detecting the signal further comprises correlating the signal with a nucleic acid molecule corresponding to a predetermined position within that pattern.

25. The method of claim 24, wherein the polymerases, sample nucleic acid molecules, or oligonucleotide primers are fixed to the substrate in the predetermined pattern in channels which have been etched in an orderly array.

26. The method of claim 24, wherein the polymerases, sample nucleic acid molecules, or oligonucleotide primers are fixed to the substrate in the predetermined pattern by micropipetting droplets onto a substrate.

27. The method of claim 24, wherein the micropipetting droplets onto a substrate is performed manually or with an automated arrayer.

28. The method of claim 5, wherein the unique emission signals are detected with a charged-coupled device (CCD) camera and converted into the nucleic acid sequence.

29. The method of claim 5, wherein the unique emission signals are stored in a computer readable medium.

30. A substrate to which is attached a GFP-polymerase.

31. The substrate of claim 30, wherein the GFP-polymerase contains an affinity tag that attaches the GFP-polymerase to the substrate.

32. The substrate of claim 31, wherein the GFP-polymerase is attached to the substrate by a linker.

33. The substrate of claim 30, wherein the GFP-polymerase contains aequorin.

34. A method of sequencing a sample nucleic acid, comprising:

attaching a polymerase to a substrate;

allowing a sample nucleic acid and an annealed oligonucleotide to bind to the polymerase in the presence of nucleotides for incorporation into a complementary nucleic acid, wherein the polymerase and nucleotides are cooperatively labeled with donor and acceptor fluorophores that emit a unique signal when a particular nucleotide is incorporated into the complementary nucleic acid;

detecting a sequential series of the unique signals as the nucleotides are sequentially added to the complementary nucleic acid; and

converting the series of the unique signals into a nucleic acid sequence.

35. A method of sequencing a sample nucleic acid, comprising:

attaching a sample nucleic acid to a substrate;

adding an oligonucleotide primer;

allowing the oligonucleotide primer to anneal to the attached sample nucleic acid;

adding a polymerase in the presence of nucleotides for incorporation into a complementary nucleic acid wherein the polymerase and nucleotides are cooperatively labeled with donor and acceptor fluorophores that emit a unique signal when a particular nucleotide is incorporated into the complementary nucleic acid;

allowing the polymerase to bind to the nucleic acid;

detecting a sequential series of the unique signals as the nucleotides are sequentially added to the complementary nucleic acid; and

converting the series of the unique signals into a nucleic acid sequence.

36. A method of sequencing a sample nucleic acid, comprising:

attaching an oligonucleotide primer to a substrate;

adding a sample nucleic acid to be sequenced;

allowing the oligonucleotide primer to anneal to the sample nucleic acid;

adding a polymerase in the presence of nucleotides for incorporation into a complementary nucleic acid wherein the polymerase and nucleotides are cooperatively labeled with donor and acceptor fluorophores that emit a unique signal when a particular nucleotide is incorporated into the complementary nucleic acid;

allowing the polymerase to bind to the nucleic acid;

detecting a sequential series of the unique signals as the nucleotides are sequentially added to the complementary nucleic acid; and

converting the series of the unique signals into a nucleic acid sequence.

37. A device for sequencing a nucleic acid molecule comprising:

a substrate to which a polymerase, oligonucleotide primer, or sample nucleic acid is attached wherein the polymerase includes a donor fluorophore;

a viewing means for viewing the polymerase;

a detection means for detecting a characteristic signal from an acceptor fluorophore carried by a corresponding nucleotide, as the nucleotide is added to the nucleic acid molecule by the polymerase;

an electromagnetic radiation source that excites the donor fluorophore but not the acceptor fluorophore; and

a decoding means for converting a series of characteristic signals into a nucleic acid sequence.

38. The device of claim 37, wherein the substrate comprises a glass microscope slide.

39. The device of claim 37, wherein the electromagnetic radiation source comprises a laser.

40. The device of claim 37, wherein the viewing means comprises a microscope objective.

41. The device of claim 37, wherein the detection means comprises a CCD camera.

42. The device of claim 37, wherein the decoding means for converting the unique signal into a nucleic acid sequence comprises a digital computer.

43. The device of claim 37, wherein the substrate comprises a three-dimensional matrix.

44. A device for sequencing a nucleic acid molecule comprising:

a glass microscope slide to which an oligonucleotide primer, sample nucleic acid, or polymerase is attached, wherein the polymerase includes a donor fluorophore;

a laser positioned to stimulate the donor fluorophore with laser light at a first wavelength range which induces the donor fluorophore to emit a signal at a second wavelength range that stimulates an acceptor flurorophore but not the donor fluorophore, and the signal emitted by the acceptor fluorophore is unique to each type of nucleotide, further wherein the first wavelength does not stimulate the acceptor fluorophore to emit the signal characteristic of the nucleotide;

a microscope objective positioned for viewing a sequence of signals emitted by the acceptor fluorophores as nucleotides are added to a sequence by the polymerase, wherein the sequence of signals corresponds to a nucleic acid sequence;

a spectrophotometer that converts the sequence of signals into a series of spectrographic signals of the acceptor fluorophore;

a CCD camera for detecting the sequence of signals; and

a digital computer which converts the sequence of signals into the nucleic acid sequence.

45. A device for sequencing a nucleic acid molecule comprising:

a glass microscope slide to which a polymerase is attached, wherein the polymerase includes a donor fluorophore;

a laser positioned to stimulate the donor fluorophore with laser light at a first wavelength range which induces the donor fluorophore to emit a signal at a second wavelength range that stimulates an acceptor fluorophore but not the donor fluorophore, and the signal emitted by the acceptor fluorophore is unique to each type of nucleotide, further wherein the first wavelength does not stimulate the acceptor fluorophore to emit the signal characteristic of the nucleotide;

a microscope objective positioned for viewing a sequence of signals emitted by the acceptor fluorophores as nucleotides are added to a sequence by the polymerase, wherein the sequence of signals corresponds to a nucleic acid sequence;

a spectrophotometer that converts the sequence of signals into a series of spectrographic signals of the acceptor fluorophore;

a CCD camera for detecting the sequence of signals; and

a digital computer which converts the sequence of signals into the nucleic acid sequence.

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